REMARKS/ARGUMENTS

35 U.S.C. § 112 Rejections

In paragraph 1 of the Office action, claims 3-4, 14-15, and 23-27 are rejected because "the scope of meaning of the terms Col_Index and Row_Index and how they are applied to a row or column shift is unclear." This ground of rejection is respectfully traversed. The terms Col_Index and Row_Index are self-defining; a column index is a number (index) representing the columns in an array and a row index is a number (index) representing the rows in an array. As disclosed in the instant application:

> [0076] Using the expression (2 *Col_Index) MOD (8), the local counters in each of the processing elements may be set to an initial count as illustrated in FIG. 17.

Fig. 17 provides the following:

FIG. 17

0	2	4	6	0	2	4	6
0	2	4	6	0	2	4	6
0	2	4	6	0	2	4	6
0	2	4	6	0	2	4	6
0	2	4	6	0	2	4	6
0	2	4	6	0	2	4	6
0	2	4	6	0	2	4	6
0	2	4	6	0	2	4	6

Substituting into the above equation a number from 0 to 7 for the column index provides the following:

(2 * 0) Mod (8) = 0

(2 * 1) Mod (8) = 2 [8 goes into 2 zero times with a reminder of 2]

(2 * 2) Mod (8) = 4 [8 goes into 4 zero times with a reminder of 4]

(2 * 3) Mod (8) = 6 [8 goes into 6 zero times with a reminder of 6]

(2 * 4) Mod (8) = 0 [8 goes into 8 one time with a reminder of 0]

(2 * 5) Mod (8) = 2 [8 goes into 10 one time with a reminder of 2]

(2 * 6) Mod (8) = 4 [8 goes into 12 one time with a reminder of 4]

(2 * 7) Mod (8) = 6 [8 goes into 14 one time with a reminder of 6]

Thus, it is seen that the equation (2 *Col_Index) MOD (8) provides the necessary count values for each row in the array. It is respectfully submitted that the terms Col_Index and Row_Index are clear on their face, and no amendment to claims 3-4, 14-15, and 23-27 is required.

Claims 12 and 23 have been amended to address the antecedent basis issue and lack of clarity issue, respectively.

Claim 28 has been amended to address the antecedent basis issue. In view of the foregoing, the rejection of claims 3-4 and 14-28 under 35 U.S.C. § 112 is believed to be overcome.

35 U.S.C. § 103 Rejection of Claim 1

On page 3 of the Office action, claims 1-28 stand rejected as being unpatentable over Taylor (U.S. Patent No. 4,992,933) in view of Huang, MC68HC12 *An Introduction: Software and Hardware Interfacing* (hereinafter "Huang"). This rejection is respectfully traversed.

In the rejection of claim 1 found in paragraph 2 of the Office action, the Office argues that Taylor teaches:

> Shifting the data along either the rows or columns of the plurality of processing elements arranged in an N x N array, where N is greater than three (see e.g. col. 9 line 65 – col. 10 line 38, fig 7a-b); and selecting from said received data a final output based on a processing element's position.

First, the Office acknowledges that claim 1 requires that the data be shifted along either the rows or columns of the plurality of processing elements until each processing element in each row or column has received the data originally held by every other processing element in that row or column. That teaching is not found in Taylor.

Second, claim 1 has been amended to recite that each of the received data is a candidate for selection. There is no disclosure in Taylor of selecting from among the received data, where each of the received data is a candidate for selection, because Taylor uses a very different control scheme. In Taylor, the data arrives at the correct location at the end of the execution of the command. As discussed in the example in Taylor in column 9, beginning at line 36:

> [E]xactly M steps along the path leads to the correct processing element for the mapping. The North West quadrant of one possible way of setting out the set of loops for a 32 by 32 processor array is

> illustrated in FIG. 6. The remaining quadrants can be inferred by rotational symmetry.
>
> It will be noticed that some loops are shorter than others and some have a clockwise and some an anti-clockwise direction of shift as indicated by the arrows. However, the common factor for each of the loops is that a bit which is shifted 33 times along the loop on which it is located will end up in the corresponding position in the adjacent quadrant. In other words, in 33 steps, the whole array is rotated by 90 degrees. (emphasis added.)

As is apparent from the foregoing quotation, in Taylor, data received at steps M-1, M-2, M-3, etc. are not candidates for selection. In contrast, in the invention of claim 1, let's assume that M equals three and that counters in PEs A, B, C, and D are set to values as follows:

Counter in PE A, M=3,

Counter in PE B, M-1=2,

Counter in PE C, M-2=1 and

Counter in PE D, M-3=0

The counter in each PE decrements its count by one each time a command is executed. PE D selects its original data as the output value because its counter value already equals zero. PE C selects the data that it receives after a shift command is executed once, because after one execution of the shift command, PE C's counter equals zero. In a similar manner, PE B selects the data that it receives after the shift command is executed twice and PE A selects the data that it receives after the shift command is executed three times. In that manner, all the data that a PE receives is a candidate for selection. In contrast, in Taylor, all the PEs of Taylor select the data received at the end of M steps. Data received at steps M-3, M-2, and M-1 are not candidates for selection.

The secondary reference to Huang does not cure the deficiencies of the primary reference to Taylor. First, Huang is directed to the manipulation of bits within a bit field, which is not the same thing as the transfer of data between processing elements in an array of processing elements. Second, because Huang is directed to bit field manipulation, i.e., horizontally arranged bits in a field are being rearranged, there is no suggestion of rearranging data within a column. Third, even if the examiner is correct in his assertion that Huang's teaching of manipulation of bits within a bit field would lead one of ordinary skill in the art to transfer data in a row of

processing elements, such a modification of the primary reference would render the primary reference inoperable. For example, Taylor provides the following example:

> For ease of illustration the algorithm is shown for an 8 by 8 processor array in FIGS. 7a and 7b. It can easily be developed for a 32 by 32 processor array. The algorithm runs in two steps. The first runs for four cycles and has the NEWS setting shown in FIG. 7a. The second step runs in one cycle and is simply a global shift west. This has the NEWS setting shown in FIG. 7b. The algorithm takes 1+n/2 cycles to implement X-axis reflect on an n by n array (in even). Col. 10, lines 11-19 (emphasis added)

To modify the complicated algorithm of Taylor by substituting a series of west shifts would render the algorithm of Taylor completely inoperable.

On page 4 of the Office action, the examiner asserts that it would have been obvious to one of ordinary skill in the art to combine the teachings of Taylor and Huang to shift data through all elements of a row or column so that each row or column has received the data originally held by every other processing element in that row or column. However, as discussed above, doing so would render Taylor inoperable, so there would be no motivation to do so.

The examiner next asserts that

> Changing the shift distance would have been obvious because it achieves the predictable result of shifting the data elements a different distance. Additionally, this uses the ability to move data to any processor in the array. It would also provide a way of counting data elements such as disclosed in Huang.

The statement that "changing the shift distance" results in "shifting the elements a different distance" does not logically support the 103 rejection. The other two sentences in this assertion similarly provide no support for the 103 rejection. For the foregoing reasons, the rejection of claim 1 should be withdrawn.

35 U.S.C. § 103 Rejection of Claim 2

In paragraph 3 of the Office action, claim 2 stands rejected in view of the combination of Taylor and Huang. Note that claim 2 depends from claim 1, and claim 1 recites "selecting from said received data . . . a final output based on a processing element's position." Taylor teaches shifting all of the elements according to the count 1 + (n/2). At the end, the last data received is selected. There is no selection of data based on a processing element's position and no selecting

based on an initial count (either loaded or calculated) where that initial count is representative of the processing element's position. Accordingly, claim 2 is believed to be patentable independently of the patentability of its base claim, claim 1.

35 U.S.C. § 103 Rejection of Claims 3-4

The examiner acknowledges in paragraph 4 of the Office action that Taylor fails to explicitly teach that the initial count is given by the equation set forth in claims 3 and 4. The examiner points to Huang, p. 66, as teaching a loop count. The loop count of Huang is set equal to the number of bits in the field so that the entire bit field is rotated. In applicant's claims 3 and 4, although the entire original data in a row or column is being rotated, the data that is being selected as the final output is selected according to the expressions provided in claims 3 and 4. Huang merely provides a loop count for rotating all of the bits in the field while Taylor merely selects the data at the end of the shifts. There is no teaching in either reference of selecting some other data as the final output, where the selection is based on the processing element's position and given by the equations in paragraphs 3 and 4. It is respectfully submitted that claims 3 and 4 are patentable independently of the patentability of claim 1.

35 U.S.C. § 103 Rejection of Claim 5

In paragraph 5 of the Office action, claim 5 stands rejected on the basis of Taylor in view of Huang. It is respectfully submitted that claim 5 depends from claim 2. Therefore, the reasons asserted for the patentability of both base claim 1 and intervening claim 2 are applicable to claim 5.

35 U.S.C. § 103 Rejection of Claim 6

The examiner cites Huang, p. 66, as altering the initial count at programmable intervals by a programmable amount. Huang does nothing more than decrement a loop counter by one, not a programmable amount. Thus, it is respectfully submitted that Huang does not teach altering the initial count at programmable intervals by a programmable amount. Therefore, claim 00006 is believed to be patentable independently of the patentability of its base claim and intervening claims.

35 U.S.C. § 103 Rejection of Claim 7

It is respectfully submitted that claim 7 depends from claim 5. Therefore, the reasons for patentability set forth in conjunction with base claim 1 and intervening claim 2 are equally applicable to claim 7.

35 U.S.C. § 103 Rejection of Claim 8

In the Office action, paragraph 8, the examiner asserts that Huang at p. 66 teaches selecting when the current count is nonpositive. This assertion is respectfully traversed. Huang, at p. 66, simply teaches shifting the data a number of times equal to the number of fields. There is no data selected. Thus, it is believed that claim 8 is patentable independently of the patentability of its base and intervening claims.

35 U.S.C. § 103 Rejection of Claims 9, 10 and 11

It is respectfully submitted that each of claims 9, 10, and 11 are dependent claims which depend directly, or indirectly, from claim 1. Therefore, the reasons for allowance set forth above with respect to claim 1 are equally applicable to claims 9, 10, and 11.

35 U.S.C. § 103 Rejection of Claims 12-22

In paragraph 12 of the Office action, claims 12-22 stand rejected "for reasons corresponding to those given above for claims 1-11." Applicant therefore repeats the arguments set forth above with respect to claims 1-11.

35 U.S.C. § 103 Rejection of Claims 23-27

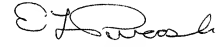
In paragraph 13 of the Office action, claims 23-27 stand rejected "for reasons corresponding to those given above for claims 1-11." Applicant therefore repeats the arguments set forth above with respect to claims 1-11. Additionally, although applicant asserts it is not possible to have a "1x1 array," claim 23 has nevertheless been amended to provide a minimum value for n.

35 U.S.C. § 103 Rejection of Claim 28

Finally, in paragraph 14 of the Office action, claim 28 stands rejected "for reasons corresponding to those given above for claim 1." Accordingly, the reasons set forth above for the patentability of claim 1 are repeated herein with respect to the rejection of claim 28.

Applicant has made a diligent effort to place the instant application in condition for allowance. Accordingly, a notice of allowance for claims 1-28 is respectfully requested. If the examiner is of the opinion that the instant application is in condition for disposition other than through allowance, the examiner is respectfully requested to contact applicant's attorney at the telephone number listed below.

Respectfully submitted,



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